

ABSTRACT

The present invention provides a grain-oriented electrical steel sheet with an extremely low core loss by scanning by a small focused laser beam spot and a method of production of the same, that is, a grain-oriented electrical steel sheet improved in electrical characteristics by scanning by a continuous wave fiber laser of the TEM₀₀ mode with a wavelength λ of $1.07 \leq \lambda \leq 2.10$ μm substantially perpendicular to the steel sheet rolling direction and at substantially constant spacing and a method of production of the same, wherein a rolling direction focused spot diameter d (mm) of the irradiated beam, a linear scan rate V (mm/s) of the laser beam, an average output P (W) of the laser, a width of the formed laser scribing traces or width of the electrical domains W_1 (mm), and a rolling direction P_1 (mm) of the laser scribing traces are in the following ranges:

$$0 < d \leq 0.20$$

$$0.001 \leq P/V \leq 0.012$$

$$0 < W_1 \leq 0.20$$

$$1.5 \leq P_1 \leq 11.0$$